AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Fig. ___1___. this sheet, which includes Fig. 1, replaces the original sheet including Fig. ___1___. In Fig. ____1____, previously omitted legend "(PRIOR ART)" has been added.

REMARKS

Drawings

Applicant respectfully submit that the amended drawing page submitted herewith cured the Office's objection. The Applicant respectfully requests that the Office withdraw its objection.

Claim Rejections – 35 USC § 103

The Office has quoted the statute from 35 USC 103(a), which is referenced herein. The Office has rejected claim 1-7, 16, 17, 19, and 20 as being unpatentable over the that which the Office alleges to be Applicant's Admitted Prior Art, in view of US Patent Nos. 6,674,091 and 5,459,332 issued to Gunapala et al. and Carruthers, respectively. Applicant has carefully considered the Office rejections and respectfully submits that the amended claims, as supported by the arguments herein, are distinguishable from the cited reference.

According to the MPEP §2143.01, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to one of ordinary skill in the art."

A useful presentation for the proper standard for determining obviousness under 35 USC §103(a) can be illustrated as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art; and
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Figure 1 of the claimed invention, cited by the Office as Admitted Prior Art, does illustrate an ideal field distribution, superimposed upon an actual field distribution. In this illustration a plurality of quantum wells are disposed between a GaAs Emitter Contact and a GaAs collector contact. The context is best provided by the following paragraphs from the background of the claimed invention.

> **[0004]** Figure 1 illustrates the conduction-band of a typical QWIP structure and its field distribution. As can be seen, the structure includes a GaAs emitter contact, a stack of quantum well and barrier layers, and a GaAs collector contact. A voltage is applied across the structure, with a ground state near the well bottoms, and an excited state near the well tops. In the stack area, electrons are generated because of light absorption by the wells. Electrons are also present at the emitter area, because it is a doped contact layer. However, there is no photo absorption at the emitter, as there are no quantum wells there. ***Thus, the only electrons that come from the emitter into the stack are dark electrons, often referred to as dark current.*** [Emphasis added]
>
> **[0005]** Because there is no photocurrent generation to cause the electrons to flow from the emitter into the stack, other mechanisms must be used. In particular, the emitter electrons are provided to the stack by one of thermionic emission, tunneling, and thermally-assisted tunneling. Ideally, the field distribution across the device is uniform, as indicated by the constant slope from the emitter to the collector. In actuality, however, the current generated by thermionic emission, tunneling, or thermally-assisted tunneling is substantially smaller than the *photocurrent generated by the wells*. As such, the actual field distribution is not constant, but effectively adjusts itself to satisfy the requirements for a constant current flow through the device. [Emphasis added]
>
> **[0006]** In more detail, the actual field distribution (shown as dashed line in Figure 1) includes a high resistance junction between the emitter and the stack, where most of the device voltage is distributed, as indicated by the dashed line having the steeper slope. This high resistance point is sometimes referred to as the high field domain. The remainder of the voltage is distributed across the relatively lower resistance stack of the

QWIP, as indicated by the dashed line having the less steep slope. In accordance with Ohms' Law, therefore, the current flow through the device remains constant, but only at the cost of a non-uniform field distribution.

Thus, dark electrons, while they contribute to background noise, are, paradoxically, indispensable to the operation of the device, not merely present. The demands of constant current flow lead to the buildup of charge in the device unless dark electrons are present to replenish those electrons depleted through the operation of the device. In instances, such as Figure 1 where a high resistance point exists between the emitter and the stack, and especially where measures are taken to minimize or reduce dark electrons, non-uniform fields result in a time delay. The applicant notes that such a non-uniform field can result in a dielectric relaxation effect.

The applicant respectfully notes that the claimed invention specifically seeks to "enable dark electrons to move rapidly from the emitter contact layer into the stack thereby reducing the dielectric relaxation effect." As noted above, this requires dark electrons.

In contrast to the claimed inventions, the '091 reference does not disclose or suggest "an electron launcher configured with a plurality of steps to enable dark electrons to move rapidly from the emitter contact layer into the stack, thereby reducing dielectric relaxation effect." Instead, the relevant portion cited by the Examiner specifically describes limiting the dark current by "upwardly grading barriers" between the quantum wells. In essence, the '091 reference seeks to compensate for the current induced slope of the electron distribution of Figure 1 of the claimed invention by increasing the down slope side of the barrier, thereby minimizing tunneling that is facilitated when the electron "perceives" the thinning of the barrier resulting from the induced slope. This retards passage of dark electrons and dark current. While, as noted by the '091 reference, such a configuration can be expected to reduce noise, the speed of the device, is reduced. It would not therefore have suggested placing a plurality of steps as an electron launcher to increase the flow of the dark electrons. Simply put, the '091 reference not only fails to suggest

the claimed invention, but teaches the undesirability of increased dark current and disclosed measures which would further retard the passage of dark electrons.

Similarly, the '332 reference fails to suggest modifying the device of Figure 1 to provide increased dark electron passage through a plurality of quantum wells. The '332 reference fails to disclose a quantum well stack. While there are a large variety of photodetectors, quantum well infrared photodetectors (QWIPs) are distinct field, and one skilled in the art would not consider the '332 device to be analogous or relevant to the claimed invention. The '332 would have entirely different demands for sensitivity and noise reduction than a quantum well device, as its efficiency and other parameters would be different. Consequently, the tolerance for dark current would be different. The '332 reference cites as the reason for its graded transition the necessity to the diminishment of noise resulting from trapped thermal conduction band electrons, trapped by the barrier. Importantly, the barrier of the '332 is provided specifically to prevent an excessive dark electron flow or current.

As the emitter generates the current in the '332 reference, in contrast to the claimed invention, where the quantum wells generate a preponderance of the current (see above). Thus the gradations suggested by the '332 reference if applied to the Figure 1, would be applied to the barriers within the wells. Such a configuration would be highly problematic and the benefits of the QWIP would be diminished. The encouragement of dark electron flow, such as by a device configured according to claim 1, would, therefore, be counter productive to the express purpose of the '332 reference. The Applicant therefore submits that the claimed invention is not analogous to the '332 reference, is taught away from by the cited '332 reference, and is not disclosed or suggested by the '332 reference either alone or in combination with other references.

The applicant respectfully submits that the claimed invention of Claims 1 and 16 is patentably distinct from the cited reference, either alone or in combination. Claims 2-8 and 17, 19-20 are dependant from Claims 1 and 16 respectively. The applicant therefore, respectfully, requests that the Office withdraw its rejection of the pending claims 1-8, 16-17, and 19-20.

Telephone Interview

The applicant requests that the Office call the undersigned attorney to discuss any remaining issues in a telephone interview and thereby further prosecution of this case.

Applicant believes the above amendments and remarks to be fully responsive to the Office Action, thereby placing this application in condition for allowance. No new matter is added. Applicant requests speedy reconsideration, and further requests that Examiner contact its attorney by telephone, facsimile, or email for quickest resolution, if there are any remaining issues.

Respectfully submitted,

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Annotated Sheet Showing Changes

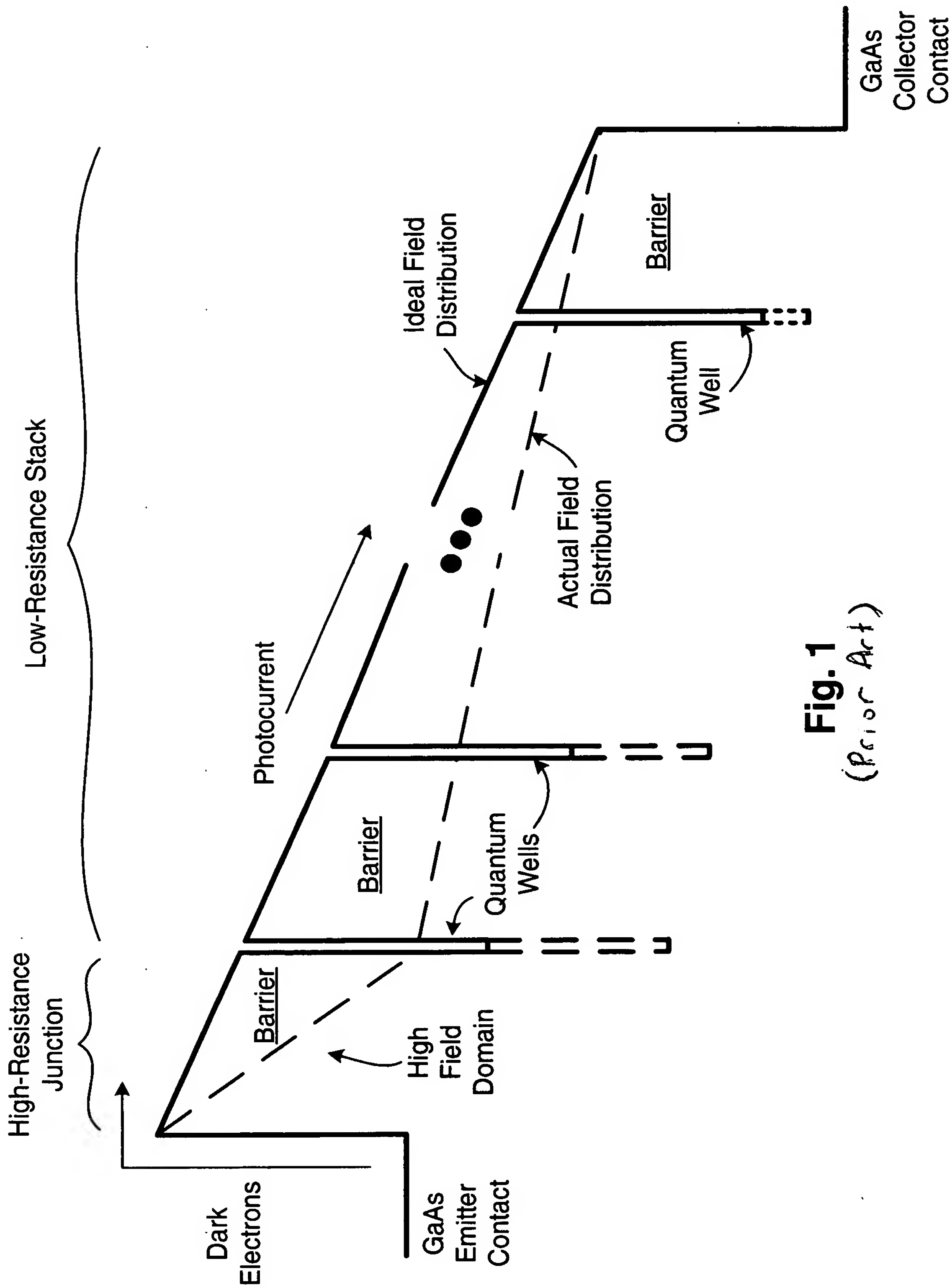

Fig. 1
(Prior Art)